

CLAIMS

1. A method of manufacture comprising the following steps:

(a) joining a first portion of a length of film material to a back of a length of a first flangeless zipper strip having a first closure profile on its front;

5 (b) joining a second portion of said length of film material to a back of a length of a second flangeless zipper strip having a second closure profile on its front, said first and second closure profiles of said respective lengths of said first and second zipper strips being interlockable to form a length of string zipper assembly;

10 (c) after steps (a) and (b), removing a first unattached marginal portion of said length of film material that extends beyond said joined first portion of said length of film material, leaving a first tail portion of said length of film material unattached to said first flangeless zipper strip; and

(d) after step (c), joining said first tail portion of said length of film material to said first flangeless zipper strip.

15 2. The method of manufacture as recited in claim 1, further comprising the following steps:

20 (e) after steps (a) and (b), removing a second unattached marginal portion of said length of film material that extends beyond said joined second portion of said length of film material, leaving a second tail portion of said length of film material unattached to said second flangeless zipper strip; and

(f) after step (e), joining said second tail portion of said length of film material to said second flangeless zipper strip.

25 3. The method of manufacture as recited in claim 2, further comprising the step of loading a slider onto said string zipper.

4. The method as recited in claim 2, wherein said length of film material is advancing continuously during said joining and removing steps and is not advancing during said slider loading step.

5                   5. The method as recited in claim 1, further comprising the step of folding said length of film material along a line that places said first and second portions of said length of film material in mutually confronting positions.

6. The method as recited in claim 1, wherein said film material is made of thermoplastic material, and each of said joining steps comprises the step of conductive heat sealing thermoplastic material to said zipper strips.

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7. The method as recited in claim 3, further comprising the following steps:

                  folding said length of film material along a line that places said first and second portions of said length of film material in mutually confronting positions;

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                  fusing said first and second flangeless zipper strips together in first and second zones of fusion having respective centerlines separated by a distance equal to one package length;

                  sealing opposing portions of said folded length of film material together along first and second zones of cross sealing having respective centerlines separated by a distance equal to one package length, the centerline of said first zone of cross sealing being generally collinear with the centerline of said first zone of fusion, and the centerline of said second zone of cross sealing being generally collinear with the centerline of said second zone of fusion; and

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                  cutting said string zipper and said film material generally along said centerlines.

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8. A machine comprising:

first joining means for joining a first portion of a length of film material to a back of a length of a first flangeless zipper strip;

5 second joining means for joining a second portion of said length of film material to a back of a length of a second flangeless zipper strip;

first trimming means for removing a first unattached marginal portion of said length of film material that extends beyond said joined first portion of said length of film material, leaving a first tail portion of said length of film material unattached to said first flangeless zipper strip; and

10 third joining means for joining said first tail portion of said length of film material to said first flangeless zipper strip,

wherein said first trimming means is disposed between said first and third joining means.

15 9. The machine as recited in claim 8, wherein said third joining means comprise a heated contact surface of a member made of heat-conductive material.

10. The machine as recited in claim 9, wherein said contact surface has a generally constant concave profile along its length.

11. The machine as recited in claim 8, further comprising:

20 second trimming means for removing a second unattached marginal portion of said length of film material that extends beyond said joined second portion of said length of film material, leaving a second tail portion of said length of film material unattached to said second flangeless zipper strip; and

25 fourth joining means for joining said second tail portion of said length of film material to said second flangeless zipper strip,

wherein said second trimming means is disposed between said second and fourth joining means.

12. The machine as recited in claim 8, wherein said third and fourth joining means comprise first and second contact surfaces of respective first and second contact fingers.

13. The machine as recited in claim 12, further comprising a heater block made of heat conductive material, said first and second contact fingers projecting from one side of said heater block, and third and fourth contact fingers projecting from another side of said heater block and comprising third and fourth contact surfaces respectively, wherein said first and second contact surfaces have a profile different than a profile of said third and fourth contact surfaces.

14. The machine as recited in claim 12, wherein said first and second contact surfaces each have a profile that is concave curved, approximately rectilinear or planar.

15. The machine as recited in claim 8, wherein said first trimming means comprise a knife.

16. The machine as recited in claim 8, further comprising a slider insertion device for loading sliders onto said string zipper, said slider insertion device being located downstream of said third joining means.

17. A method of manufacture comprising the following steps:

(a) interlocking a first closure profile of a first flangeless zipper strip with a second closure profile of a second flangeless zipper strip;

(b) joining a first band-shaped portion of an elongated film structure to a back of said first flangeless zipper strip;

(c) joining a second band-shaped portion of said elongated film structure to a back of said second flangeless zipper strip;

(d) removing a first unattached marginal portion of said elongated film structure that extends beyond said joined first band-shaped portion of said elongated film structure, leaving a first tail portion of said elongated film structure unattached to said first flangeless zipper strip;

(e) joining said first tail portion of said elongated film structure to said first flangeless zipper strip; and

(f) inserting a slider on said interlocked first and second zipper strips some time after completion of steps (a) through (e).

18. The method as recited in claim 17, further comprising the following steps, performed prior to step (f):

removing a second unattached marginal portion of said elongated film structure that extends beyond said joined second band-shaped portion of said elongated film structure, leaving a second tail portion of said elongated film structure unattached to said second flangeless zipper strip; and

joining said second tail portion of said elongated film structure to said second flangeless zipper strip.

19. The method as recited in claim 18, wherein said elongated film structure is formed by folding a web of film, said first and second unattached marginal portions being adjacent opposing edges of said folded web.

20. The method as recited in claim 18, wherein said elongated film structure is formed by sealing a pair of webs along a band-shaped zone proximal to first opposing edges of said webs, said first and second unattached marginal portions being adjacent to second opposing edges of said webs.

21. The method as recited in claim 17, wherein step (a) is performed before steps (b) and (c).

22. The method as recited in claim 17, wherein steps (b) and (c) are performed before step (a).

5                   23. The method as recited in claim 17, wherein said elongated film structure is advancing continuously during said joining and removing steps and is not advancing during said slider loading step.

                  24. The method as recited in claim 17, wherein said elongated film structure is made of thermoplastic material, and each of said joining steps  
10                   comprises the step of conductive heat sealing said first and second band-shaped of said elongated film structure to said zipper strips.

25. The method as recited in claim 17, further comprising the following steps:

                  fusing said first and second flangeless zipper strips together in  
15                   first and second zones of fusion having respective centerlines separated by a distance equal to one package length;

                  sealing opposing portions of said elongated film structure together along first and second zones of cross sealing having respective centerlines separated by a distance equal to one package length, the centerline  
20                   of said first zone of cross sealing being generally collinear with the centerline of said first zone of fusion, and the centerline of said second zone of cross sealing being generally collinear with the centerline of said second zone of fusion; and

                  cutting said string zipper and said elongated film structure generally along said centerlines.

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26. An automated production line comprising the following components:

5 a first zipper sealer for sealing a first band-shaped portion of a section of a web of packaging film to the back of a section of a first flangeless zipper strip;

a first knife arranged for trimming off a first unsealed marginal portion of said section of said web downstream of said first zipper sealer; and

10 a first lip sealer arranged for sealing, to said first zipper strip, any unsealed tail portion that remains after said first unsealed marginal portion has been trimmed.

27. The automated production line as recited in claim 26, further comprising:

15 a second zipper sealer for sealing a second band-shaped portion of said section of said web to the back of a section of a second flangeless zipper strip, said first and second zipper sealers being in mutually opposing relationship;

a second knife arranged for trimming off a second unsealed marginal portion of said section of said web downstream of said second zipper sealer; and

20 a second lip sealer arranged for sealing, to said second zipper strip, any unsealed tail portion that remains after said second unsealed marginal portion has been trimmed.

25 28. The automated production line as recited in claim 27, wherein said first and second lip sealers comprise respective contact surfaces of a heated member.

29. The automated production line as recited in claim 27, wherein each of said contact surfaces of said heated member has a respective constant profile along its length.

5        30. The automated production line as recited in claim 27, further comprising a slider insertion device for loading sliders onto said first and second flangeless zipper strips, said slider insertion device being located downstream of said first and second lip sealers.

10       31. The automated production line as recited in claim 27, further comprising a supply reel from which said web of packaging film is drawn and a folding board for folding a drawn portion of said web of packaging film, said folding board being disposed between said supply reel and said first and second zipper sealers.

32. The automated production line as recited in claim 27, further comprising a supply reel from which said folded web of packaging film is drawn.

15       33. The automated production line as recited in claim 27, further comprising a supply reel from which said first and second zipper strips, in a mutually interlocked state, are drawn and a zipper guide for guiding respective drawn portions of said first and second zipper strips to a position between said first and second zipper sealers.